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authority of the Christian Scriptures" (according to the purpose of the founder of the lectureship, as announced on p. vi), what Mr. Wright does demonstrate, I should say, is that God, having, as it seems, no greater capacities than mere man, is so clearly finite as to be no longer useful.

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The Human Worth of Rigorous Thinking. By CASSIUS J. KEYSER. New York, Columbia University Press, 1916.—pp. 314.

The fifteen essays and addresses which make up this volume, nearly all upon the subject of mathematics, are rather resplendent in rhetoric, but they are interesting, and something more. To an outsider they offer altogether, especially in the chapters, about half of the whole number, which are mathematical in content rather than about mathematics, a convenient and intelligible introduction to the special developments, and also to the general point of view, of modern mathematics. Chapter V offers a very intelligible explanation of the meaning of four-dimensional space, while chapter XIII discusses the 'existence' of hyperspace. Chapter VII explains the modern 'solution' of the problem of infinity. Chapter XII, are view of Whitehead and Russell's *Principia Mathematica*, makes it clear how modern mathematics comes to call itself logic. The last chapter, on "Mathematics"—an address given in no less than twenty places, which I suppose also to be the mathematical lecture in the Columbia series of lectures on special departments of study—is an interesting and suggestive, if question-compelling, statement of the nature of mathematical thinking. The first three chapters, from the first of which the volume takes its title, are so alike in what they have to say, each of them standing for the traditionally Platonic conception of the significance of mathematical thought, that, it would seem, two of them might profitably have been omitted.

Among the many questions suggested by the volume perhaps the most interesting is the question raised by a comparison of the first chapter with the last. The burden of the first chapter is that mathematics is the only rigorous thinking, which, again, as the author explains rather frequently throughout the book, is the only real thinking. In the last chapter he repels, with some scorn, the suggestion of Oliver Wendell Holmes, among others, that, since mathematical operations may conceivably be performed by a calculating machine, mathematical thinking is not thinking at all. Such a suggestion, he tells us, is the outcome of the vulgar notion that mathematics is concerned only with reckoning; or of the notion, almost equally vulgar, that "the mathematician's mind is but a syllogistic mill and that his life resolves itself into a weary repetition of A is B, B is C, therefore A is C; and Q.E.D." (pp. 298–9).

Now, I wish to urge gently that, in so far as the mathematician's mind is *not* a 'syllogistic mill' he is not 'rigorously' thinking. Mr. Keyser explains, quite truly, I think, (pp. 294–5) that the mathematician is, in his own domain, "matching, point for point, the processes, methods, and experience familiar to the devotee of natural science"; "making guesses regarding the order and internal harmony of the data observed and collocated; testing the hypotheses, not merely by the complete induction peculiar to mathematics, but, like his colleagues of the outer world, resorting also to experimental tests and incomplete induction; frequently finding it necessary, in view of unforeseen disclosures, to abandon a once hopeful hypothesis or to transform it by retrenchment or enlargement." Furthermore (p. 301), "the master mathematician is constantly required to exercise judgment—judgment, that is, in matters not admitting of certainty" —"a function analogous to that of the comparative anatomist like Cuvier." I shall pass over the larger question, whether 'rigorous thinking' is not a contradiction in terms—whether, namely, a rigorous nexus of things and a reflective consideration of things do not stand for tendencies in contrary direction; and I will simply ask how one who is engaged in "making guesses," in resorting to "incomplete induction," in correcting "once hopeful" hypotheses, and, finally, in exercising "judgment," "in matters not admitting of certainty," can claim any especial distinction for his thinking on the score of rigor. Mr. Keyser, I fear, has given the whole case away. It seems that the mathematician's mind, so far as it is a genuine human mind and not a 'syllogistic mill,' is just like any other human mind.

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